

Attorney Docket No. 408204

REMARKS/ARGUMENTS

It is believed that the above amendments and the following remarks attend to all issues presented in the non-final office action of May 23, 2006. Claims 1-17, 25-26, and 28-29 remain pending in this application; of these, claims 12-17 are withdrawn.

The following paragraph is repeated from the Amendments and Responses filed on October 24, 2005 and April 4, 2006 in this application. Applicants note that none of the boxes under item (10) on the Office Action Summary page have been checked off, in the current and all previous Office Actions in this application. We are consequently unable to determine whether the drawings are accepted or objected to by the Examiner, and we request an indication thereof in the next Office Action in this application.

Specification Amendments

Applicants amend paragraph 45 to clarify that the UBM material may include titanium, tungsten, vanadium, tin, gold, silver, or lead. Support for this amendment is at least found in original claim 4. No new matter is added by this amendment.

Claim Amendments

Applicants amend the claims as follows. No new matter is added by Applicants' amendments to the claims.

Applicants amend claim 1 to incorporate the following limitations of claim 2: (1) the microchip containing a wafer, and (2) the step of forming including depositing an adhesion layer onto the wafer. Furthermore, Applicants amend claim 1 to include depositing an adhesion layer onto the wafer via a screen printing process. Support for depositing an adhesion layer onto the wafer via a screen printing process is found at least in paragraphs 39, 45 of Applicants' specification.

Applicants amend claim 2 to remove limitations that have been incorporated into claim 1 as amended.

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Applicants amend claim 4 to remove vanadium and copper from the group of UBM materials. Support for this amendment is found at least in amended paragraph 45 of Applicants' specification.

Applicants amend claim 5 to remove the rectangular shape. Support for this amendment is found at least in paragraphs 12 and 14 of Applicants' specification as filed.

Applicants cancel claim 27 without prejudice.

Claim Rejections – 35 USC §103

Applicants note that the Examiner has referred to subsets of Applicants' application as "Applicant's Admitted Prior Art" ("AAPA"). Applicants respectfully state that they do not concede that what the Examiner has labeled as AAPA is necessarily prior art.

Claims 1-11 and 29 stand rejected under 35 U.S.C. 103(a) as being unpatentable over the AAPA in view of U.S. Patent No. 6,372,622 to Tan et al. (hereinafter, "Tan"). Applicants respectfully disagree.

To establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a), three basic criteria must be met:

(a) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the references or to combine reference teachings;

(b) there must be a reasonable expectation of success; *and*

(c) the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure (emphasis added) MPEP § 2143.

"The mere fact that the prior art *may* be modified in the manner suggested by the Examiner *does not make the modification obvious* unless the prior art suggest the

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desirability of the modification." (emphasis added) *In re Fritch*, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992).

The AAPA and Tan, even when combined, fail to render claims 1-11 and 29 obvious because the references do not teach or suggest all of the claim limitations.

Claim 1 as amended includes the limitation "depositing an adhesion layer onto the wafer via a screen printing process." Neither the AAPA nor Tan disclose or suggest a screen printing process. Accordingly, neither the AAPA, Tan, nor their combination can render claim 1 unpatentable. Additionally, claim 1 has additional reasons for patentability over the AAPA and Tan, including the reasons disclosed below.

Claim 1 discloses a "solder bar presenting an elongate axis parallel to a plane of the footprint." Neither the AAPA nor Tan disclose or suggest this limitation.

Turning first to the AAPA, the Examiner asserts the AAPA discloses a solder bar; specifically, the Examiner asserts that element 3A of Applicants' Fig. 2 is a solder bar. Applicants continue to respectfully disagree and maintain that the AAPA does not disclose or suggest a solder bar. As disclosed in paragraph 35 of Applicants' specification, element 3A is a solder ball – not a solder bar. Applicants respectfully maintain that a bar is different than a ball. A bar is well known to be "[a] relatively long, straight, rigid piece of solid material". WEBSTER'S II NEW COLLEGE DICTIONARY, 89 (2001). In contrast, a ball is well known to be "a spherical or almost spherical body." *Id.* at 85. An object may not be long, straight and spherical or almost spherical at the same time; accordingly, an object cannot be both a bar and a ball.

Furthermore, the solder balls of Applicants' FIG. 2 do not present an elongate axis parallel to a plane of the footprint. In particular, a "ball" (e.g., an unreflowed solder ball) does not have an elongate axis, while the reflowed solder balls shown in FIG. 2 present an elongate axis in the wrong direction, that is, perpendicular to a plane of the footprint (e.g., a plane formed by UBM 27 where it meets solder ball 3C in FIG. 2).

Turning next to Tan, Tan teaches a method of forming a bump structure. Col. 2, lines 17-20; claim 1. Tan does not teach or suggest that the bump structure is a solder

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bar presenting an elongate axis parallel to a plane of the footprint; in fact, Tan teaches away from such limitation. Figures 9-12 show various masking features and their corresponding solder shapes. Applicants respectfully assert that none of the corresponding solder shapes have an elongate axis with respect to the plane of their footprint (opening 22).

Additionally, claim 1 includes the limitation "to place the microchip in made-ready condition for installation prior to reflowing the solder for bonding to the circuit connection." The examiner references solder ball 3A of Applicants FIG. 2 as disclosing this limitation. Applicants continue to respectfully disagree with the Examiner; Applicants direct the Examiner's attention to paragraphs 34 and 35 of Applicants' specification, which states that FIG. 2 shows chip scale package 2 mounted on PCB 1. Accordingly, FIG. 2 illustrates a microchip that is **already installed** on a PCB – not a microchip that is made-ready for installation prior to reflowing.

Accordingly, neither the AAPA, Tan, nor their combination can render claim 1 unpatentable. Accordingly, Applicants respectfully request withdrawal of the Examiner's rejection to claim 1.

Claims 2-11 and 29 depend directly or indirectly from claim 1 and benefit from like argument. However, these claims have additional features that patentably distinguish over the AAPA and Tan, including the features discussed below.

Claim 4, as amended, recites the limitation "wherein the step of depositing the UBM material includes depositing a conductor selected from at least one of titanium, tungsten, tin, aluminum, gold, silver, and lead." The Examiner asserts that such limitation is disclosed in paragraph 8 of Applicants' specification. Applicants respectfully disagree and call the Examiner's attention to the fact that paragraph 8 does not mention the UBM material. Furthermore, Tan does not disclose or suggest UBM material consisting of titanium, tungsten, tin, aluminum, gold, silver, or lead. Accordingly, neither the AAPA, Tan, nor their combination can render claim 4 obvious.

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Claim 5 as amended recites the limitation "wherein the step of forming the socket includes forming the socket such that the socket has predetermined dimensions complementary to a microchip connection pad footprint having a geometry selected from the group consisting of "E," "L," and "U" shapes." The Examiner asserts that item 29 of Applicants' FIG. 2 discloses such limitation. Applicants respectfully disagree and call the Examiner's attention to the fact that FIG. 2 shows a side view of chip scale package 2, and that item 29 is a passivation layer. Applicants' specification, paragraph 35. Applicants respectfully assert that the side view of FIG. 2 does not show the geometric shape of the socket with respect to a microchip connection pad footprint; therefore, FIG. 2 can not disclose or suggest the limitations of claim 5. Furthermore, Tan does not disclose or suggest a socket having geometric dimensions of "E", "L", or "U" shapes. Accordingly, neither the AAPA, Tan, nor their combination can render claim 5 obvious.

Claim 6 recites the limitation "wherein the step of forming the socket includes the physical dimensions selected from the group consisting of ring, square, and circular shapes." The Examiner asserts that item 20A of Applicants' FIG. 2 discloses such limitation. Applicants respectfully disagree and call the Examiner's attention to the fact that FIG. 2 shows a side view of chip scale package 2. Applicants' specification, paragraph 35. Applicants respectfully assert that the side view of FIG. 2 does not show the physical dimensions of a socket as recited in claim 6. Accordingly, the AAPA and Tan cannot be combined as cited by the Examiner to render claim 6 obvious.

Claim 7 recites the limitation "wherein the step of forming the solder bar comprises forming a solder bar having a planar rectilinear configuration wherein a plane of the solder bar is parallel to the socket and the elongate axis." The Examiner asserts that item 20A of Applicants' FIG. 2 discloses such limitation. Applicants respectfully disagree and call the Examiner's attention to the fact that FIG. 2 shows a side view of chip scale package 2. Applicants' specification, paragraph 35. As stated above with respect to claim 1, the elongate axis is parallel to the plane of the footprint. Applicants respectfully assert that FIG. 2 cannot show the elongate axis because the elongate axis would not be visible in the side view of the chip scale package of FIG. 2.

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Furthermore, Tan does not disclose that Tan's solder bump structure has a planar rectilinear configuration or is parallel to an elongate axis parallel to a plane of the footprint. Tan teaches away from such limitation, which can be appreciated by referring to Tan's figures 9-12, which show various masking features and their corresponding solder shapes. Applicants respectfully assert that none of the corresponding solder shapes have a planar rectilinear configuration or are parallel to an elongate axis parallel to a plane of the footprint (opening 22). Accordingly, neither the AAPA, Tan, nor their combination can render claim 7 obvious.

Claim 8 recites the limitation "wherein the step of forming the solder bar comprises forming a solder bar having a planar curvilinear configuration wherein a plane of the solder bar is parallel to the socket and the elongate axis." The Examiner asserts that items 3A and 20A of Applicants' FIG. 2 discloses such limitation. Applicants respectfully disagree and call the Examiner's attention to the fact that FIG. 2 shows a side view of chip scale package 2. Applicants' specification, paragraph 35. As stated above with respect to claims 1 and 7, the elongate axis is parallel to the plane of the footprint. Applicants respectfully assert that FIG. 2 cannot show the elongate axis because the elongate axis would not be visible in the side view of the chip scale package of FIG. 2.

Furthermore, Tan does not disclose a solder bar having a planar curvilinear configuration. Additionally, as stated above with respect to claim 7, Tan does not disclose or suggest a planar curvilinear configuration with a plane parallel to the socket and an elongate axis. Accordingly, neither the AAPA, Tan, nor their combination can render claim 8 obvious.

For at least these reasons, neither the AAPA, Tan, nor their combination can render claims 2-11 and 29 unpatentable. Accordingly, Applicants respectfully request withdrawal of the Examiner's rejections to claim 2-11 and 29.

Claims 25 and 26 are rejected over the AAPA and Tan and further in view of U.S. Patent No. 6,977,396 to Shen et al. (hereinafter "Shen"). Applicants respectfully disagree.

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Claims 25 and 26 depend from claim 1 and therefore benefit from like argument. Furthermore, claim 25 recites the limitation "wherein forming a socket comprises forming the socket such that one of a depth and a width of the socket is at least twice the other of the depth and the width." Applicants respectfully assert that neither Shen nor sections of Applicants' application that the Examiner has labeled as AAPA disclose or suggest a relationship between a depth and width of a socket.

For at least these reasons, neither the AAPA, Tan, Shen, or any combination of these references can render claims 25 and 26 unpatentable. Accordingly, Applicants respectfully request withdrawal of the Examiner's rejections to claims 25 and 26.

Claims 27 and 28 are rejected over the AAPA and Tan and further in view of U.S. Patent Application Publication No. U.S. 2003/0157789 to Tong et al. (herein after "Tong"). As stated above, Applicants canceled claim 27 without prejudice. Applicants respectfully call the Examiner's attention to the fact that claim 28 depends indirectly from 1, and therefore benefit from like argument. For at least this reason, claim 28 cannot be rendered unpatentable by the AAPA, Tan, Tong, or any combination of these references. Accordingly, Applicants respectfully request withdrawal of the Examiner's rejection to claim 28.

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CONCLUSION

In view of the above Amendments and Remarks, Applicants have addressed all issues raised in the Office Action dated May 23, 2006, and respectfully solicit a Notice of Allowance. Should any issues remain, the Examiner is encouraged to telephone the undersigned attorney.

The Commissioner is authorized to charge \$510.00 for the extension of time fee and any additional required fees to deposit account 12-0600.

Respectfully submitted,

LATHROP & GAGE L.C.

Date: 11/22/06

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